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REPORT

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Verification, Refinement, and Applicability of Long-Term Pavement Performance Vehicle Classification Rules

Chapter 2. Introduction To Vehicle Classification

FHWA developed a standardized vehicle classification system in the mid-1980s. This system was the result of compromises designed to meet the needs of many traffic data users. Pavement designers were an important segment of those users but by no means the only intended audience. Another segment of key users comprised the safety community, which was (and still is) highly interested in the amount of travel occurring in multi-unit vehicles (that is, power units of various types pulling trailers of various configurations).

In addition to these needs was the requirement that the electronic equipment and sensors available at the time (mostly simple road tubes) be able to differentiate passing vehicles into the desired classifications. Available sensors were capable of measuring the presence of vehicles, detecting axles, and determining the distance between consecutive axles on the basis of the speed of each vehicle as it passed over the sensors.

Current FHWA 13-Category Rule Set

The result of that 1980-era work is the FHWA 13-category classification rule set currently used for most Federal reporting requirements and that serves as the basis for most State vehicle classification counting efforts. The FHWA classification system is shown in table 1.

Table 1. FHWA vehicle classification definitions.

Class Group	Class Definition	Class Includes	Number of Axles
1	Motorcycles	Motorcycles	2
2	Passenger Cars	All cars Cars with one-axle trailers Cars with two-axle trailers	2, 3, or 4
3	Other Two-Axle Four-Tire Single-Unit Vehicles	Pick-ups and vans Pick-ups and vans with one- and two-axle trailers	2, 3, or 4
4	Buses	Two- and three-axle buses	2 or 3
5	Two-Axle, Six-Tire, Single-Unit Trucks	Two-axle trucks	2

Class Group	Class Definition	Class Includes	Number of Axles
6	Three-Axle Single-Unit Trucks	Three-axle trucks Three-axle tractors without trailers	3
7	Four or More Axle Single-Unit Trucks	Four-, five-, six- and seven-axle single-unit trucks	4 or more
8	Four or Fewer Axle Single-Trailer Trucks	Two-axle trucks pulling one- and two-axle trailers Two-axle tractors pulling one- and two-axle trailers Three-axle tractors pulling one-axle trailers	3 or 4
9	Five-Axle Single-Trailer Trucks	Two-axle tractors pulling three-axle trailers Three-axle tractors pulling two-axle trailers Three-axle trucks pulling two-axle trailers	5
10	Six or More Axle Single-Trailer Trucks	Multiple configurations	6 or more
11	Five or Fewer Axle Multi-Trailer Trucks	Multiple configurations	4 or 5
12	Six-Axle Multi-Trailer Trucks	Multiple configurations	6
13	Seven or More Axle Multi-Trailer Trucks	Multiple configurations	7 or more
14	Unused	----	----
15	Unclassified Vehicle	Multiple configurations	2 or more

---- Indicates not applicable

As part of the development and adoption of this 13-category system, John Wyman of the Maine Department of Transportation produced an initial rule set (commonly called Scheme F) to convert the axle spacing information available from axle sensing data collection equipment into estimates of the number of vehicles in each of the 13 FHWA vehicle categories. This initial rule set has been revised many times by many different individuals, companies, and agencies. These revisions are designed to deal with two major factors:

1)The FHWA definitions are based on vehicle characteristics that can be easily identified visually but that cannot be perfectly computed based on the basis of the number, weight, and spacing of axles.

This problem is exacerbated by the following fact:

2)Truck characteristics may change significantly from State to State because vehicle owners and manufacturers build and optimize vehicles to maximize their profit-generating potential, which depends on the truck size and weight laws in each State.

The first of these problems is illustrated in figure 1 and figure 2. The two pickup trucks shown have the same number of axles and similar axle spacing. However, because the pickup truck in figure 1 has a conventional (two-tire) rear axle, it is defined as a Class 3, whereas because the truck in figure 2 has dual tires on each side of its (four-tire) rear axle, it is defined as a Class 5. When empty, these trucks weigh essentially the same. Therefore, correctly classifying them is problematic no matter which State's WIM or automatic vehicle classification (AVC) rule set is used. (Please note that the following four photos were taken with a camera associated with the data collection device. The vehicles were moving at about 60 mi/h, which accounts for the blurring.)